Influence of palaeoenvironment and palaeogeography on source rock potential and theoretical gas storage capacity of roof shales (drilling KB174, Hechtel-Hoef, Campine Basin, Belgium)

W. Vandewijngaerde[1,2], K. Piessens[2], B. Krooss[3], P. Bertier[3] & R. Swennen[1]

1 KU Leuven, Earth and Environmental Sciences, Leuven, Belgium
2 Royal Belgian Institute of Natural Sciences, Geological Survey of Belgium, Brussels, Belgium
3 RWTH Aachen, Energy & Mineral Resources, Aachen, Germany

Organic-rich shale deposits rich can be regarded as source and reservoir rocks for natural gas. Present-day research mainly focus on marine black shales, while other organic rich deposits are mostly overlooked, for instance shales in coal sequences.

This study presents a re-evaluation of Rock-Eval data from 47 roof shale samples of the KB174 drilling (GSB 047E0196, Hechtel-Hoef) in the Campine Basin (Belgium) in terms of TOC (Total Organic Carbon) and S2 (amount of hydrocarbons released during pyrolysis). The averages are respectively 3.6% and 7.93 mg/g and show a good source rock potential (Vandewijngaerde *et al.*, 2013). These values differ when different palaeoenvironments (Paproth *et al.*, 1996) are taken into account. The average TOC values for palaeoenvironment A, B and C, ranging respectively from least to most marine influenced in the continental realm, measure 4.19% (A), 2.53% (B) and 3.69% (C). Averages for S2 are 9.47 mg/g (A), 5.53 mg/g (B) and 7.46 mg/g (C). The average TOC and S2 also differ for Westphalian A (6.37% and 13.14 mg/g) and Westphalian B (2.42% and 5.72 mg/g). Nonetheless, a regression trend line analysis of the TOC vs. S2 plots indicates that there are no significant differences in kerogen type. In other words, the differences in source rock potential are not due to the organic content of the sediment, but because of its potential to deposit and preserve organic matter, resulting in a higher TOC content.

A petrophysical analysis is conducted to study whether palaeoenvironment and palaeogeography affects storage capacity. Natural gas can be stored as free gas in the pore spaces or as sorbed gas on the surface of clay or organic particles (Jarvie *et al.*, 2007). Porosity is measured by means of low-pressure sorption with CO_2 and N_2, helium pycnometry and mercury injection porosimetry (MIP). High-pressure methane sorption determines the sorption capacity.

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